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LOSSES ON THE BATTLE-FIELD.

BY DR. LOUIS ELKIND.

FROM whatever point of view it may be considered, it is certain that war between two great Powers never fails to command the attention of the whole civilized world. The military man, for instance, takes keen interest, say, in the tactics displayed by the rival armies and their generals; the commercial world, taking it as a whole, is concerned as to the effect events will have on trade in general and finance in particular. As a matter of fact, no section of society can be regarded as a disinterested witness of a great conflict between two powerful nations. Apart from these considerations, it can safely be said that what most vividly impresses the mind of the general public is the number of losses sustained by each side. Put briefly, there is an idea, more or less generally prevalent, that, in consequence of the ever-increasing deadliness of the arms used in battle, and the immense number of shots that can be projected in a given time, the losses nowadays are greater than occurred in the wars of former times. On the whole, this idea gained ground during the South-African War, and it has become still more general since the outbreak of the Russo-Japanese War. For this, no doubt, some of the newspaper correspondents are much to be blamed: as a rule, they are not deterred from sending greatly exaggerated reports of losses, just as they did of the losses recently sustained in the streets of St. Petersburg on the so-called "Vladimir Day." Unfortunately, no official report has been published as yet of the actual number of casualties sustained in the fierce fighting at 203 Metre Hill and Akasaku-yama, which took place during the last days of November and the first five days of December, when important positions were captured and retaken time and again. In this instance, no doubt, the percentage of loss must have considerably exceeded previous records. For this battle—in which small tins containing dynamite, hand-grenades and large high-explosive shells were used—was fought on both sides with a bravery and savagery more reckless than any modern historian has as yet registered. But, apart from this, the number of killed and injured in the other battles fought between the forces of Russia and Japan is certainly not above the normal, and is, moreover, relatively far less than was the case in many former encounters, say, during the first half of the last century, and still further back. The Crusaders, for instance, lost whole armies, and Gustavus Adolphus lost, in the vicinity of Nuremberg in 1632, half of his men between the middle of August and the end of September. In each of these cases, however, it was disease much more than the arms of the enemy that was the cause.

In a military campaign, deaths result from three principal causes: first, defective sanitary arrangements; secondly, inadequate medical and surgical treatment; thirdly, the arms of the enemy. As time has gone on, science and civilization have made great and rapid progress, and, as a consequence, considerable and far-reaching improvements have been made under each of these three heads, that is to say, towards preserving life and towards the means of destroying it.

As regards sanitary measures, the advance made in this direction, particularly during the last three or four decades, and the highly beneficial results and the radical improvements by which it was attended are, on the whole, well known and, therefore, no more need be said on this point.

A subject, however, of very great interest is that of army surgery and its development, even if for no other reason than that it helps to explain in an obvious and satisfactory manner why it is that fewer men are lost in modern warfare than there used to be. The space at my disposal does not permit of going into details; but it is interesting to record that the first notable scientific treatise on the subject is the work of an Italian surgeon named Vigo, which was published, under the heading of "*De Vulnere Facto ab Instrumento quod Bombarda Nuncupatur,*" in the second decade of the sixteenth century. So great was Vigo's reputation that this publication was regarded by the author's contemporaries as something almost infallible, and the precepts laid down therein were for years carried out practically to the letter, especially by those surgeons who were attached to the armies of Charles V and Francis I. From the historic point of view, however, it should be added that this was not actually the first essay dealing with battle-field surgery. H. Brunschwig, a German surgeon, wrote one twenty years earlier; but as he was, comparatively speaking, an obscure man, his work attracted little or no attention. On the other hand, Vigo enjoyed some reputation as a philosopher; and, as philosophy and medicine were in those days regarded as inseparable sciences, and, moreover, as he was at the same time the friend and medical adviser of Pope Julius II, his celebrity was all the greater. Vigo is, therefore, always considered as the pioneer of this particular branch of surgical work, or, rather, he was until quite recently. For a very interesting discovery was made in this respect just about thirty years ago; and, as this fact is far from being generally known, it deserves to be recorded here.

Amongst the literary bequests made by a German physician there was found a long essay in the shape of a manuscript, written some four centuries ago, and dealing with this subject of the surgical treatment of wounded men. Its author was a lay brother of a certain monastic order, who, it would appear, was present at the siege of Marienburg—that is, as far back as 1457—and who, indeed, saw much fighting in the course of his life. So far as we know, the monk was the first man to write down his ideas as to the best way to treat wounds sustained in battle, but he did not publish his essay, which, by the way, is dated 1460.

Further, when Vigo's famous work was given to the world, powder had not long been discovered, and was just then beginning to be used—at least to a general extent. Naturally enough, his interest was largely aroused by this discovery; and, after long and laborious investigations into the matter, as he tells us, "he felt justified in expressing his view to the effect that a shot fired by powder poisoned the wound made, the explosive being the poisonous element." Again, continuing his researches, he came to the conclusion that the best way to treat such a wound was "to cauterize it, and then pour boiling oil into it"—a frightful infliction on the unfortunate man who fell into the surgeon's hands. The high esteem in which Vigo was held by his professional brethren was mainly responsible for the fact that these barbarous measures were carried out to the letter, and innumerable wounded men died in consequence.

Indeed, no chapter in the whole history of Medicine and Surgery affords such painful reading as does that which relates to this particular period of dealing with wounds and similar injuries. Great and important discoveries, as is well known, are made by accident, and here we have again, as will be seen later on, a confirmation of this rule.

Amongst the originally misguided surgeons who were in the employ of Charles V and of Francis respectively, were two who are justly entitled to fame, for one of them laid the foundation, from the scientific point of view, of the theory and practice of surgery, and the other did a like service with regard to the anatomical sciences. The latter, Andreas Vesalius, used surreptitiously to make *post-mortem* examinations of the bodies of fallen soldiers, and thus gained what was in his day a remarkable and accurate knowledge of anatomy. Ambroise Paré, the surgeon, a Frenchman, had, so he tells us in his exceedingly interesting and instructive book, "*Le Voyage de Thurin*," never seen a wound on the battle-field before joining the army in what he calls "an official and responsible position." However, he had carefully studied Vigo's famous treatise; and when he was called upon to attend wounded soldiers he carried out the philosopher's instructions, until, as he cheerfully admits, he became short of oil. He says:

> "I did not sleep during the following night, for I was haunted by the thought of the unfortunate men whose wounds I had not been able to cauterize in the usual way. With the dawn of morning I hurried to them, filled with fear that they would be poisoned and dead. But what a miracle! Those whom I had not cauterized slept well, their wounds were practically free of any inflammatory signs—such as, for instance, redness and swelling—and, moreover, they complained of little or no pain: on the other hand, those who had been treated strictly according to Vigo's precepts exhibited a most painful and, indeed, heartrending appearance, for none of the classical signs of inflammation were absent."

From that moment it became clear to Paré that the almost inhuman treatment of wounded men which Vigo so successfully advocated was in the highest degree responsible for the huge losses the army had sustained, and he decided to discontinue all cauterization. To make a long story short, Paré went even so far as to test in a practical manner the theory according to which powder was a highly poisonous substance. He administered "*la poudre à canon*," as he terms it, internally to wounded soldiers, who felt no ill effects. Happily, in this striking way a new order of things was prepared for. As a matter of fact, surgical science was thereupon placed on what may be described as a proper and scientific basis; and, as it was just about that time that firearms were first being used to a considerable extent in warfare, the importance of the discovery of the harmfulness of Vigo's conclusions cannot well be overestimated.

Speaking generally, one of the reasons why the public are led to suppose that modern battles are more deadly than those of past times, is that rifles and guns have a far greater range now than hitherto. The result of this, however, is that battles are fought between enemies separated by a considerable distance, and it can be shown that the greater the distance the less deadly is the shot that finds a human billet. Thus, as the range has increased, the chances of being killed on the spot, or dangerously injured, have markedly decreased. This is, indeed, so much the case that, whilst in the great battles fought, say, between 1741 and 1878 (including the Russo-Turkish War), out of each hundred hit twenty-five perished immediately, the percentage of immediate deaths in more recent campaigns, according to the latest statistics, did not exceed 17.3, and, as a rule, it varied between 7.5 and 15.1.

Now, as regards the effectiveness of long-distance shots, a simple but very interesting experiment—which tends to explain how it came about that the number of immediate deaths in warfare has been reduced to such a favorable and pronounced degree—may be briefly described here. If, say, a hollow leaden ball which is quite empty be fired at from a short distance, the bullet will pass right through and cause no other damage than the making of two holes; but, if that ball were filled with water or some other fluid or pulpy matter, it would be broken into fragments. Suppose, however, that it were placed at a considerable distance from the firearm, then, even though it were filled with some thick fluid, the effect of the shot would be just the same as if it were empty. The greater the distance, then, the less the effect, and this holds good as regards certain parts of the human body, especially the skull. When the skull is penetrated by a bullet fired at a short distance from it, the skin which covers it is torn into numerous pieces, the bone itself is broken into fragments, and parts of the brain protrude as if taken out artificially; but, if the bullet has travelled a long distance, the skin, though torn, holds the skull bones together, and these bones, instead of being smashed, are merely fissured, and, as a rule, are well amenable to modern surgical treatment. The extremities, too, are affected in the same manner, that is to say, they are wounded according to distance, but, on the other hand, it must be admitted that certain other parts of the body do not conform to this rule—the abdomen and chest, for instance.

Taken altogether, the increased efficiency of arms used in warfare has had the somewhat paradoxical effect of reducing, to a very considerable extent, the soldier's chance of being killed on the spot. Other causes which have helped to lessen the average of deaths are the introduction of arms of small calibre, and the discontinuance of soft lead bullets in favor of those of harder material. Soft lead bullets are much the more deadly; indeed, it has been shown beyond doubt that, when a soft lead bullet reaches the tissue, it splits into small parts—splashes, as it were—and thus inflicts terrible injuries, inasmuch as it destroys all the tissues, soft and hard, around. On the other hand, the hard lead bullet cuts through the tissue and blood-vessels as cleanly as a knife and penetrates all the layers of tissue; consequently, the damage done is materially less and, from the therapeutic point of view, far more favorable.

In connection with this, it should be pointed out that soft bullets were not abandoned from humane motives so much as from the consideration of good marksmanship. It has been found that particles of such bullets remain in the barrel of the rifle after being fired, and correct aiming soon becomes difficult or impossible. Then, also, a hard bullet can be fired a far greater distance, and, moreover, it maintains its velocity. But, all the same, from the humane point of view it is well that soft bullets are no longer used to any great extent.

Again, on two vital points at least we are left in darkness, as it were, by history. For historians, taking them as a whole, do not tell us as to the undercurrents which mould the destinies of nations—and such information would have been most valuable just now, in view of the recent tragic events in Russia. Nor have they come to any definite opinion as to what percentage of an army should be killed or wounded before defeat is acknowledged—a fact the importance of which does not require any further comment. The student must, therefore, make close examination of much of the mass of data there is to hand. The figures of killed and wounded in some of the world's greatest battles impress one very strongly with the fact that, the more perfect the training and discipline of the troops, the greater are the losses sustained before there is occasion to admit defeat. In the times of Frederick the Great and of Napoleon, enormous losses—proportionally speaking, perhaps the largest ever reached—were inflicted on the armies of those great generals, and still there was no necessity to retreat or capitulate: facts which have led military historians to conclude that never were armies more perfectly trained for war than those commanded by Frederick and Napoleon. In direct contrast to this, we have records of battles between contending factions in small states in which the percentage of men lost by the losing side was as low as 0.5 or even 0.3. This was notably the case in the Liberation Wars in some of the minor German States (1848-1849), but the Italians, too, especially during that particular period, do not seem to have offered stubborn resistance to the victorious Austrians. For the former were defeated at the battle of Custozza (1848) and at that of Novara (1849) with a loss of 0.9 and 3.7 per cent. respectively. The same remark applies, amongst others, to the wars of the Hungarian Insurrection. The less the discipline, therefore, the sooner are troops demoralized when under fire. On the other hand, Russian armies have not been defeated until the ranks have been reduced to the extent of 30 or 45 per cent.—a circumstance which tends to confirm the reports of many eye-witnesses that Russians in battle are quite indifferent to death. The losses sustained by the British troops in some of the battles in South Africa, in which they were defeated, were comparatively very small, only 2.5 or 4.8 per cent. of the whole, this being one of the reasons why Continental critics expressed such strongly adverse views on the work of the British generals. Taking this matter of the percentage of losses in battle as a whole, it would be highly desirable that, in the event of an international conference being again held to decide as to what kind of explosives should or should not be used in civilized warfare, the question should also be discussed as to what is the largest percentage of losses that can or should be sustained before an army is defeated. For in the proceedings of the International Conference on this subject, held at St. Petersburg in 1868, no precise indication on this point is contained. And, on the other hand, the statistics, as we have them, are so varied that they are confounding.

Interesting, also, would it be to ascertain what amount of explosive and shot is required, or rather has been required, to put one man out of action, striking, of course, an average. The information which we have on this point is very meagre. In one battle, however, "the Battle of the Nations," we are told that 12,000,000 cartridges were used on the side of the Allies, together with 179,000 gun charges, and that these killed or wounded 48,000 men on the French side. It follows, therefore, that only one shot in 250 found a human billet. Every hit was, therefore, obtained at an enormous expenditure of ammunition. That battle (Leipsic) was fought as far back as October, 1813, but in more recent battles the average expenditure has been reduced considerably. It would seem that, at the time when smooth-bore rifles were used, 325 cartridges were fired for every adversary hit, while the old muzzle-loaders necessitated an expenditure of between 350 and 475 shots; but, with the breech-loader, not more than some 120 cartridges, or thereabouts, are required to obtain one successful shot. The conflict in South Africa was conducted on far different lines from what had ever prevailed before. Battles were fought in which the contending sides were a long distance apart, and the Boers in particular were generally well under cover. Consequently, the number of shots fired which had no effect was unusually large.

Another point to be considered is that losses are generally very unevenly distributed amongst the various troops, this, of course, being in accordance with the degree of exposure and the density of the colors on a given area of ground. Then, also, there is the question as to whether a frontal attack is made or one from the rear; in the former case, the number of successful shots made by the defenders is far greater than in the latter. Infantry, it has been shown, lose much more severely than cavalry, even though the latter get under heavy fire. In the Franco-German War—to mention only one instance—the number of killed in the infantry amounted to 52.79 per cent. as against 27.08 in the cavalry, 27.22 in the artillery and 17.63 in the pioneers—according to von Mayer's, Mayo-Smith's and G. de Molinari's statistics.

There is another important point which deserves particularly to be emphasized, namely, that in nearly all the great battles the number of officers killed is considerably greater, relatively speaking, than the number of men, the proportion, on an average, being 28.04 per cent. against 13.7 per cent.—a circumstance which well illustrates the bravery, as well as the sense of responsibility, of the leaders of the men in all armies.

As I have already pointed out, a great number of circumstances have happily combined to bring about a gradual and considerable reduction in the average losses in modern battles. However, a little further inquiry into this matter may not be without interest. First of all, such weapons as swords and lances, which were used with very deadly effect during a long period of history, and notably so in the course of the Thirty Years' War, during which Germany sustained a loss in life of at least 11,750,000, are now not well adapted to use in battles, and have been abandoned for the most part—that is to say, to a percentage, if compared with other arms, as low as 3.8 or even 1.1. The musket, also, a most effective weapon, has gone; and, strange as it may seem, the improved rifle which has taken its place does not bring about nearly so many losses in the enemy's ranks. The soldier who was hit by a bullet fired from a musket may be said, in almost every case, to have looked death in the face. The modern rifle has a much greater range than the musket, but is of smaller calibre. This latter point makes it less deadly; but, then, the object of firing is not so much to kill one of the enemy as to put him out of action. Again, it was the practice, until quite recently, to extract a bullet which had become lodged in the body, with the consequence that, in the course of the operations, matter capable of causing some infection was often introduced into the body, with a fatal result. But it has been discovered, largely in the course of treatment of cases of attempted suicide, that, even when a bullet has entered such a vital organ as, say, the brain, the patient may recover without the bullet's being touched. This occurs in about 79 per cent. of such cases—according to some recently published statistics. Experience in this matter is in contradiction to long-established theory, but it is an experience of the utmost value, which military surgeons have turned to practical account—with remarkably good results. And, further, take the cases of injuries to the knee sustained on the battle-field. Formerly, that is until about two decades ago, as many as 83 or 87 per cent. of soldiers so injured died of their wound, but, thanks to modern surgical treatment, there has been an enormous reduction in the mortality from this cause, which now scarcely exceeds 18 per cent., and often enough it amounts to only 17 or 15 per cent.

Another important cause of the reduction of mortality is the discovery that, in cases of bullet-fracture, amputation of the injured limb is not imperative, as was formerly thought to be the case. On the whole, wounds can now be treated antiseptically, and it is only in very exceptional cases that amputation is resorted to.

Finally, a few months ago attention was called in the press to the fact that the Japanese, before going into battle, changed their shirts, evidently with the object of avoiding wound-infection that might arise from contact with the dirt and perspiration which would collect on a shirt that had been worn for some little time. The supposed "low" mortality amongst the Japanese troops was ascribed partly to this simple precaution. It is, therefore, interesting to note that experiments, which have recently been made by some reliable observers—Prof. Pfuhl amongst others—have yielded striking and unexpected results. The highly interesting fact was thus established that those kinds of bacteria, which perspiration (or dirt resulting from it) may under certain circumstances contain, are invariably of a non-virulent character—that is, they are perfectly harmless, and, consequently, the inference which has been somewhat hastily drawn is incorrect.

LOUIS ELKIND.